Marking Scheme Paper 2

No	Marking Scheme	Marks
1	(a) $h(s)=2$	
	$\frac{s+1}{2}=2$	K1
	$s=3$	N1
	(b) $g^{-1}(t)=2$	
	$\frac{t}{5}+5=2$	K1
	$t=-12$	N1
	(c) $g(x)=4x-20$	K1
	$gh(x)=4\left(\frac{x+1}{2}\right)-20$	K1
	$gh(x)=2x-18$	N1
2	a) $\overrightarrow{PS}=\frac{2}{3}\left(4\underset{\sim}{x}+12\underset{\sim}{y}\right)$	K1
	$\overrightarrow{QS}=\overrightarrow{QP}+\overrightarrow{PS}$	K1
	$=-4\underset{\sim}{x}+\frac{2}{3}\left(4\underset{\sim}{x}+12\underset{\sim}{y}\right)$	K1
	$=-\frac{4}{3}\underset{\sim}{x}+8\underset{\sim}{y}$	N1
	b) $\lvert PR\rvert=\sqrt{\left(12(2)\right)^2-\left(4(3)\right)^2}=\sqrt{432}$	K1
	$\lvert PS\rvert=\frac{2}{3}\left(\sqrt{432}\right)$	K1
	$\lvert QS\rvert=\sqrt{(12)^2+(PS)^2}=4\sqrt{21}$	N1
3	a) $t=2\cos^2\frac{A}{2}-1$	K1
	$\cos\frac{A}{2}=\sqrt{\frac{t+1}{2}}$	N1
	b) $2\left(\sqrt{1-t^2}\right)(t)$	K1
	$2t\sqrt{1-t^2}$	N1
	c) $\cos(A+2A)$	K1
	$t\left(2t^2-1\right)-\left(\sqrt{1-t^2}\right)\left(2\sqrt{1-t^2}\,(t)\right)$	K1
	$4t^3-3t$	N1
4	a) $p+9q=280$	K1
	$6(2p+11q)=2520$	K1
	Simultaneous equation	K1

	$p=100, q=20$ b) $150+(n-1)(10)=100+(n-1)(20)$ $n=6$	N1,N1 K1 N1
5	$1+2\sqrt{x-1}+(x-1)=2x-1$ $4x-4=x^2-2x+1$ $(x-1)(x-5)=0$ $x=1, x=5$ b) $2^{x+4}-2^{x+3}=2^8$ $2^x=32$ $x=5$	K1 K1 K1 N1 K1 K1 N1
6	$3x+2y=-9$ $7x-3y=-21$ $y=\frac{-9-3x}{2}$ $x=-3, y=0$ $2(-3)+3(0)+z=-1$ $z=5$	K1 K1 K1 N1,N1 K1 N1
7	$(x-1)(x-5)=0$ a) $x^2-6x+5=0$ $b=-6$ $c=5$ b) $x=3, f(x)=(3)^2-6(3)+5$ $(3,-4)$ c) $1<x<5$ d) $\max value=4$	K1 K1 N1 N1 K1 N1 N1 N1
8	a) (i) $m=\frac{1}{2}$ $y=\frac{1}{2}x+\frac{1}{2}$ (ii) $-2x+6=\frac{1}{2}x+\frac{1}{2}$ $x=\frac{11}{5}$ $y=\frac{8}{5}$	K1 N1 K1 K1

	$\left(\frac{11}{5},\frac{8}{5}\right)$	N1
	b) $\left(\frac{11}{5},\frac{8}{5}\right)=\left(\frac{2x+3(1)}{5},\frac{2y+3(1)}{5}\right)$	K1
	$\left(4,\frac{5}{2}\right)$	N1
	c) $\sqrt{(y-1)^2+(x-1)^2}=5$	K1 K1
	$y^2+x^2-2x-2y-23=0$	N1

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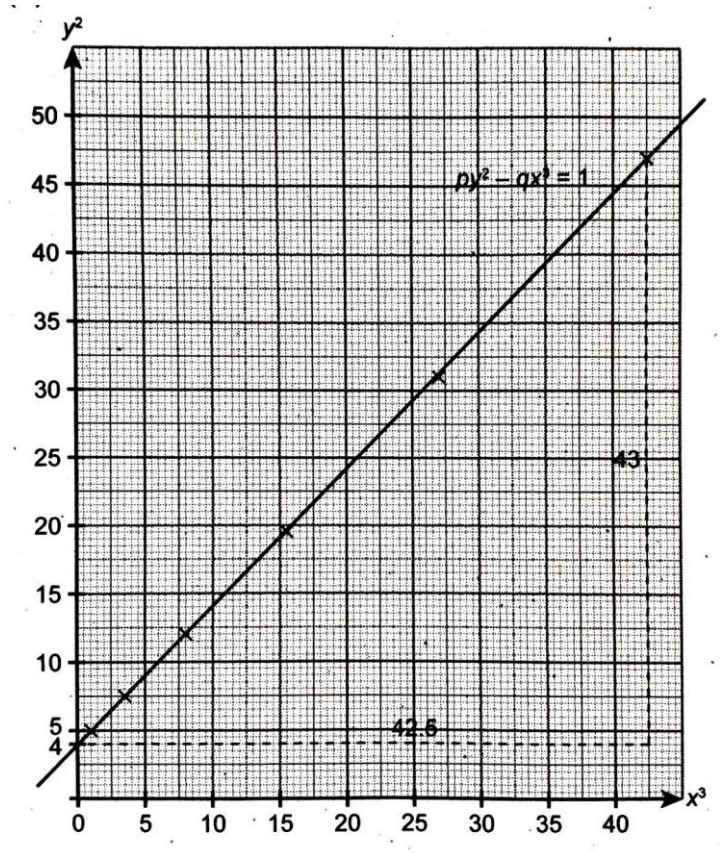
x^3	1	3.38	8	15.63	27	42.88
y^2	5.02	7.40	11.97	19.62	31.02	46.92

N1
N1



K1
K1
N1

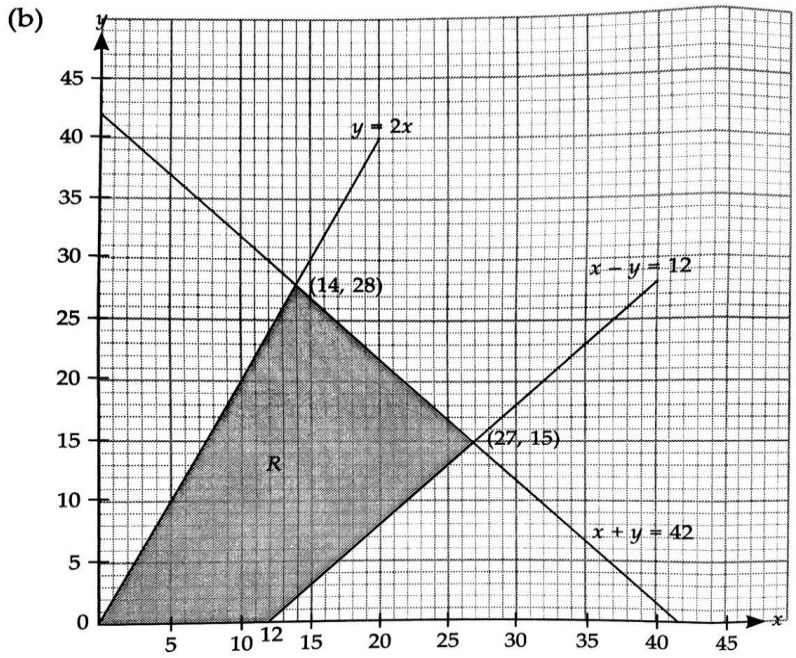
c) $y^2=\frac{q}{p}x^3+\frac{1}{p}$ P1

(i) $\frac{1}{p}=4$ K1

$p=0.25$ N1

K1

	(ii) $\frac{q}{p}=\frac{43}{42.5}$ $q=0.2530$	N1
10	(a) $-x^2+4x=2x$ $k=2$	K1 N1
	b) $-x(x-4)=0$ $Q(4,0)$	K1 N1
	c) $\int_0^2 -x^2+4x\ \text{dx} - \frac{1}{2}(2)(4)$ $\left[\frac{-x^3}{3}+\frac{4x^2}{2}\right]_0^2-4$ $\frac{4}{3}$	K1 K1 N1
	d) $\pi\int_2^4(-x^2+4x)^2\,dx$ $\pi\left[\frac{x^5}{5}-\frac{8x^4}{4}+\frac{16x^3}{3}\right]_2^4$ $\frac{256\pi}{15}$	K1 K1 N1
11	a) ${}^{10}C_0\left(\frac{1}{3}\right)^0\left(\frac{2}{3}\right)^{10}+{}^{10}C_1\left(\frac{1}{3}\right)^1\left(\frac{2}{3}\right)^9+{}^{10}C_2\left(\frac{1}{3}\right)^2\left(\frac{2}{3}\right)^8$ 0.2991	K1 K1 N1
	b) $\mu=500$ $\sigma=18.26$	N1 N1
	$i)P(Z<-0.625)$ $=0.2660$	K1 N1
	(ii) $P\left(Z>\frac{q-170}{8}\right)=0.15$ $\frac{q-170}{8}=1.036$ $q=178.29$	K1 K1 N1

12	a) (i) $p = 140$ $\frac{P_{18}}{150} \times 100 = 115$ (ii) $P_{18} = RM172.50$ $\frac{124(n)+115(3)+108(1)}{n+3+1} = 116.8$ $n = 1.97 \approx 2$ b) (i) $\frac{P_{18}}{1500} \times 100 = 116.8$ (ii) $= RM1752$ c) $\frac{100 \times 116}{108}$ $= 107.41$	N1 K1 N1 K1, K1 N1 K1 N1 K1 N1
13	(a) x + y ≤ 42 y ≤ 2x x – y ≥ 12 (b)  (b) d) (i) The range of the number of bicycles : 5 ≤ x ≤ 22 (ii) Maximum rental = 60 x + 120 y , max point (14, 28) RM 4 200	N1 N1 N1 K1 K1K1 N1 K1,K1 N1
14	(a) $s = \int t^2 - 5t + 4dt$	K1 K1

	$\frac{t^3}{3}-\frac{5t^2}{2}+4t+c$	N1
	$s=\frac{t^3}{3}-\frac{5}{2}t^2+4t$	
	$t^2-5t+4=0$	
(b)	$t=4, t=1$	
	A, t=1 , s = $\frac{11}{6}m$	N1
	B, t=4, $s=-\frac{8}{3}m$	N1
	The distance AB = $\frac{11}{6}+\frac{8}{3}=4.5m$	K1 N1
	$a=2t-5=0$	
(c)	$t=2.5\min$	N1
	At C, $s=-0.4167m$	
	OC = 0.4167 m	
	$CB=\frac{8}{3}-0.4167=2.25m$	N1
	C is closer to O.	N1
15	a) $\frac{QS}{\sin 105^\circ}=\frac{12.5}{\sin 31^\circ}$	K1
	$QS=23.44cm$	N1
	b) $RQS=44^\circ$	
	c) $RS=\sqrt{5.4^2+23.44^2-2(5.4)(23.44)\cos 44^\circ}$	
	$19.91cm$	K1 N1
	c) $\frac{\sin\angle QRS}{23.44}=\frac{\sin 44}{19.91}$	K1
	$\angle QRS=54.87^\circ$	N1
	$\angle QRS=125.13^\circ$	N1
	d) $\angle PSP'=30^\circ$	
	e) Area = $\frac{1}{2}\times 12.5\times 12.5\times\sin 30^\circ$	K1 K1
	$=39.06cm^2$	N1